Year 8 End of Year Revision

NUMBER

Number Recap

1) Without a calculator, work out the following. Leave your answers as mixed numbers where appropriate.

a) 37.4×9.8 b) $2,684.16 \div 3.6$ c) $3\frac{4}{9} - 1\frac{5}{6}$ d) $4\frac{7}{8} \div 7\frac{7}{12}$ e) $\frac{3+2\times 6}{\sqrt{2\times(22-4)}} - 5 + 3$

2) Put the following numbers in ascending order.

$$\frac{5}{8}, \quad 0.62, \quad \frac{5}{9}, \quad 58\%, \quad \frac{16}{25}, \quad 0.567, \quad 65\%, \quad \frac{7}{12}$$

3) a) Write the following as a product of their prime factors.

    i) 108   ii) 288

b) Hence, find the highest common factor and lowest common multiple of 108 and 288.

c) Use a factor tree to determine the square root of 1,296.

d) There are 128 blue smarties, 224 pink smarties and 160 yellow smarties in a packet. The packet is shared equally among some children with none left over. What is the largest possible number of children?

Percentages

1) Without a calculator, work out:

a) 28% of 48   b) 85% of 124   c) 17.5% of 84

*2) Using a calculator, work out:

a) 21% of 93   b) 146% of 59   c) 82.6% of 346

3) A builder earns £425 a week. She receives a pay rise of 12%. How much does the builder earn a week now?

4) Neil is 1.32 metres when he is eight years old. By the time he is ten years old, he is 1.65 metres. By what percentage has his height increased?

5) Sam bought a television and then sold it for £380.80, making a profit of 12%. What did Sam originally pay for the television?

*6) A car is worth £12,000. It depreciates in value by 6% every year. What is the car worth after two years?

7) Mohammed invests some money in a savings account. The interest rate is 10% in the first year and then 20% in the second year. By what percentage has Mohammed's original investment increased by at the end of the second year?

8) A shirt goes on sale for £38.25. It is 15% off the original price. What did the shirt originally cost?

9) Jacob answered 80% of the questions in a test correctly. He answered 32 of the questions correctly. Work out the total number of questions in the test.

Using a Calculator

*Use your calculator to work out the following. Write down all of the digits on the display.

a) $\frac{27}{53} + \sqrt{42}$ $\qquad$ b) $\sqrt[3]{57 - 23} + 2.3$ $\qquad$ c) $32\pi - 1.3^4$ $\qquad$ d) $\frac{3 \times 5^2}{9.7 - 2} + \sqrt[4]{280}$

Rounding and Estimating

1) Round the following numbers to the given number of decimal places.

a) 36.75 (1dp) $\qquad$ b) 3.973 (2dp) $\qquad$ c) 92.0561 (2dp) $\qquad$ d) 115.99 (1dp)

2) Round the following numbers to the given number of significant figures.

a) 475 (1sf) $\qquad$ b) 3,641 (3sf) $\qquad$ c) 6,003 (2sf) $\qquad$ d) 0.00308 (2sf) $\qquad$ e) 0.07498 (3sf)

3) Estimate the following calculations.

a) $42 - 2.6 \times 11.8$ $\qquad$ b) $\frac{9.8 \times 7.45}{3.5 + 6.42}$ $\qquad$ c) $\frac{116 \times 3,461}{884.2 - 585}$ $\qquad$ d) $\frac{32.4 \times 2.8}{0.236}$

4) Is your estimate for 3c an overestimate or underestimate? Show your reasoning.

Indices

1) Simplify the following, leaving your answer as a power.

a) $(2xy^2)^3$ $\qquad$ b) $\frac{a^4 \times a^5}{a^3}$ $\qquad$ c) $2^3 \times 4^2$ $\qquad$ d) $7^x \times 7^3$ $\qquad$ e) $\frac{125^3}{25^2} \times 5^3$

2) Find the value of x.

a) $16^x = 2^{64}$ $\qquad$ b) $4^x + 4^x + 4^x + 4^x = 64$ $\qquad$ c) $27^x = 3^{2x+1}$

3) Evaluate the following.

a) 4^{-2} $\qquad$ b) $9^{\frac{1}{2}}$ $\qquad$ c) $25^{-\frac{1}{2}}$ $\qquad$ d) $27^{\frac{2}{3}}$ $\qquad$ e) $36^{-\frac{3}{2}}$ $\qquad$ f) $(\frac{4}{5})^0$ $\qquad$ g) $(\frac{8}{27})^{-\frac{1}{3}}$

4) Find the value of x.

a) $9^x = 3$ $\qquad$ b) $7^x = \frac{1}{7}$ $\qquad$ c) $64^x = 16$ $\qquad$ d) $(\frac{2}{3})^x = \frac{9}{4}$ $\qquad$ e) $x^{-3} = \frac{1}{27}$ $\qquad$ f) $x^{\frac{1}{2}} = 9$ $\qquad$ g) $x^{\frac{2}{3}} = 4$

Standard Form

1) Convert the following to standard form.

a) 12,300 $\qquad$ b) 8,409,000 $\qquad$ c) 67,000,000,000 $\qquad$ d) 0.0036 $\qquad$ e) 0.000000895 $\qquad$ f) 0.00030960

2) Convert the following to ordinary numbers.

a) 7×10^5 $\qquad$ b) 2.9×10^9 $\qquad$ c) 1.072×10^3 $\qquad$ d) 8×10^{-5} $\qquad$ e) 4.57×10^{-2} $\qquad$ f) 3.689×10^{-8}

3) Without a calculator, work out the following, leaving your answers in standard form.

a) $3.5 \times 10^5 \times 2 \times 10^3$ $\qquad$ b) $4 \times 10^{15} \times 6.4 \times 10^{11}$ $\qquad$ c) $3.2 \times 10^{-5} \times 8 \times 10^{-13}$

d) $8 \times 10^7 \div 4 \times 10^2$ $\qquad$ e) $3 \times 10^4 \div 5 \times 10^{-9}$ $\qquad$ f) $6 \times 10^{-10} \div 8 \times 10^{-1}$

Ratio and Proportion

1) Simplify the following ratios.

a) $36 : 54$ $\qquad$ b) 2.4 m : 64 cm $\qquad$ c) $0.45 : 4.2$ $\qquad$ d) $\frac{5}{6} : \frac{2}{15}$

2) £400 is shared between Adam, Ben, and Charlie. Adam gets twice as much as Ben and Ben gets three times as much as Charlie. How much does Ben get?

3) If a : b = 5 : 9 and b : c = 12 : 11, what is the ratio a : c?

4) The ratio of males to females who work in an office is 3 : 8. There are 95 more males than females. How many people work in the office altogether?

5) There are 125 people at a party and the ratio of men to women is 12 : 13. How many more women are needed to change the ratio to 3 : 5?

6) Which is better value for money – 9 toilet rolls for £3.15 or 4 toilet rolls for £1.36? Show your working.

7) It takes 4 builders 9 days to build a wall. How long will it take 6 builders to build the same wall?

8) 140 children will be at a school sports day. Lily is going to give a cup of orange drink to each of the 140 children. She is going to put 200 millilitres of orange drink in each cup. The orange drink is made from orange squash and water. The orange squash and water are mixed in the ratio 1 : 9 by volume. Orange squash is sold in bottles containing 750 millilitres. Work out how many bottles of orange squash Lily needs to buy.

9) Ben had 156 red and yellow beads in the ratio 7:6. He gave away equal numbers of red and yellow beads, after which the ratio of red to yellow beads was 7:3.

a) Did the fraction of red beads increase, decrease, or stay the same?

b) How many beads did Ben give away?

Recurring Decimals

1) Convert the following fractions to decimals.

a) $\frac{5}{16}$ b) $\frac{4}{9}$ c) $\frac{7}{11}$ d) $\frac{7}{12}$ e) $3\frac{11}{18}$ f) $\frac{6}{7}$

2) Convert the following decimals to fractions. Simplify where possible.

a) $0.\dot{5}\dot{4}$ b) $0.3\dot{6}$ c) $0.\dot{3}4\dot{2}$ d) $0.9\dot{1}\dot{5}$ e) $2.78\dot{6}$

ALGEBRA

Algebra Recap

1) Simplify the following expressions.

a) $2d^2 \times 3dg \times 4gh$ b) $4m + 3n - 11 - 10m - 7n + 5$ c) $2x^2 - 5x + 6x^2 - 8xy$

2) Solve the following equations.

a) $4(2x - 3) = 8$ b) $\frac{3x}{4} + 5 = 17$ c) $\frac{5x - 7}{3} = 10$

d) $3x - 8 = 4 + 5x$ e) $2(3x + 4) - 3(6x - 1) = 10$ f) $10 - 2x = 7x - 5$

g) $\frac{7x}{2} - 3 = 3x - 1$ h) $\frac{2x+3}{9} = \frac{x-5}{5}$ i) $\frac{3x + 1}{5} - \frac{2x - 7}{3} = 8$

3) Alex thinks of a number, adds five, multiplies by three and subtracts seven. His answer is exactly four times his starting number. Form an equation to represent this. Hence find Alex's starting number.

4) For the following questions, $a = 3, b = 4, c = -2, d = \frac{1}{2}, e = -\frac{2}{3}$. Work out the value of the following.

a) $c^2 \div (a - b)$ b) $\frac{4c + a}{d}$ c) $\sqrt{a + b - c}$ d) $3d - e$ e) $ac - \frac{3b^2}{b + c}$

*5) Using trial and improvement, solve $x^2 + 2x = 40$ correct to 1 decimal place. You must show working.

Expanding Brackets

1) Expand and simplify the following.

a) $3(2m + 3) + 2(5m - 1)$ 　　　　b) $4(3a - 8) - 7(2 - 5a)$ 　　　　c) $2(7y - 3) - 5(4y + 3)$

2) Expand and simplify the following.

a) $(x + 5)(x - 3)$ 　　　　b) $(2a - 3)(a - 4)$ 　　　　c) $(y + 7)^2$ 　　　　d) $(4b + 5)(4b - 5)$

Factorising Expressions

Factorise fully the following expressions (be careful – some are single, and some are double brackets!).

a) $24x - 18$ 　　　b) $32x^2y + 28xy^2$ 　　c) $x^2 + 7x + 12$ 　　d) $x^2 - x - 20$ 　　e) $x^2 - 9$

f) $x^2 - 13x + 40$ 　　g) $42a^2 - 27a$ 　　h) $g^2 + 5g - 36$ 　　i) $4m^2 - 16n^2$ 　　j) $12xy - 20y + 8x^2$

Solving Quadratic Equations

1) Solve the following equations.

a) $(3x - 2)(x + 5) = 0$ 　　b) $x^2 + 5x + 6 = 0$ 　　　　c) $2x^2 = 98$ 　　　　d) $x^2 - 5x - 14 = 0$

e) $x^2 - 4 = 0$ 　　　　f) $x^2 + 36 = 13x$

2) The shaded area below is 18cm². Find the value of x.

2x + 1

x + 2

x + 4

x + 1
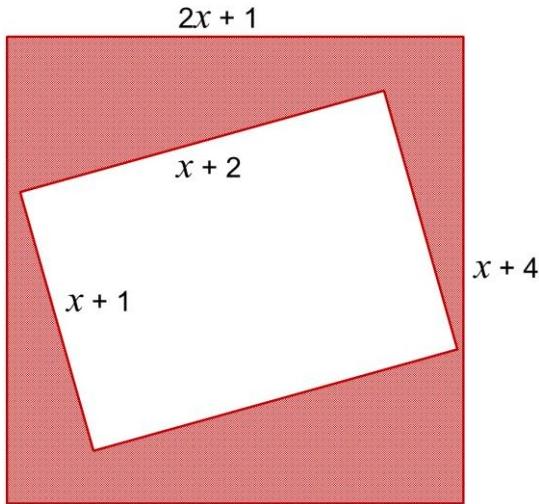
Algebraic Fractions

1) Simplify the following.

a) $\dfrac{36ab^2}{25cd} \times \dfrac{20d^3}{27a^2b}$ 　　　　b) $\dfrac{42x^4y}{25wz^2} \times \dfrac{75xz^3}{49w^5y^2} \times \dfrac{56w^3y}{48x^3z^2}$ 　　　　c) $\dfrac{3x+6}{6x-12} \times \dfrac{2x^2-4x}{4x+8}$

d) $\dfrac{24abc}{35d^2} \div \dfrac{24abc}{7d}$ 　　　　e) $\dfrac{15a-10}{24a+18a^2} \div \dfrac{9a-6}{6a^2+8a}$

2) Simplify the following.

a) $\dfrac{x}{5} + \dfrac{3x}{4}$ 　　　　b) $\dfrac{3x-2}{6} - \dfrac{2x-3}{4}$ 　　　c) $\dfrac{4}{x+5} + \dfrac{1}{x-2}$ 　　　　d) $\dfrac{5}{x-1} - \dfrac{x+2}{x^2-4x+3}$

3) Solve the following equations.

a) $\frac{6x-1}{4} - \frac{5-2x}{2} = 1$ b) $\frac{2x+1}{3} + \frac{x-5}{2} = 4$ c) $\frac{6}{x-2} - \frac{6}{x+1} = 1$

4) Work out the value of x in each of the following.

a) $3 : x = x : 12$ b) $x - 1 : 4 = x : 7$ c) $x - 3 : 2 = 7 : x + 2$

Sequences

1) Fill in the blanks for the following sequences.

a) 11, 15, ____, ____, 27... b) 23, ____, 17, ____, 11, 8... c) ____, 0.5, ____, 2, 4, 8...

2) Find the nth term of the following sequences.

a) 2, 5, 8, 11, 14... b) 8, 13, 18, 23, 28... c) 11, 7, 3, -1, -5... d) 1.2, 1.8, 2.4, 3, 3.6...

3) Find the 80th term of the sequence -13, -10, -7, -4, -1...

4) Is 247 in the sequence 5, 11, 17, 23, 29...? Show your working.

5) Write down the first five terms of the sequence with n^{th} term $3n^2 - 4n$.

6) Find the nth term of the following sequences.

a) 1, 4, 9, 16, 25... b) 3, 12, 27, 48, 75... c) 4, 13, 28, 49, 76... d) $\frac{1}{3}, \frac{2}{5}, \frac{3}{7}, \frac{4}{9}, \frac{5}{11}$...

Changing the Subject

Rearrange the following formulae to make x the subject.

a) $6x + 7y = 5$ b) $\frac{2x}{a} - b = 9$ c) $h(x + n) = k - 3$ d) $pr - 4x = a$ e) $y = \sqrt{\frac{x-d}{3}}$

f) $w = \frac{\sqrt{4x}}{k}$ g) $x^2(d - c) = ab$ h) $\sqrt[3]{ax} = 1 - y$ i) $\frac{2k+w}{x} = p$ j) $a = \frac{5}{x-y}$

Straight Line Graphs

1) In your books, draw the graphs of:

a) $y = 2x - 3$ b) $y = 3x + 1$ c) $y = 6 - 2x$ d) $2y - 7 = 3x$

2) Does the point (5,9) lie on the line $y = 4x - 11$?

3) Write down the gradient and y-intercept of the line with equation $3y + 6 = 2x$.

4) Find the point of intersection of the lines $y = 3x - 7$ and $y = -5x + 1$.

5) Find the equations of the following lines.
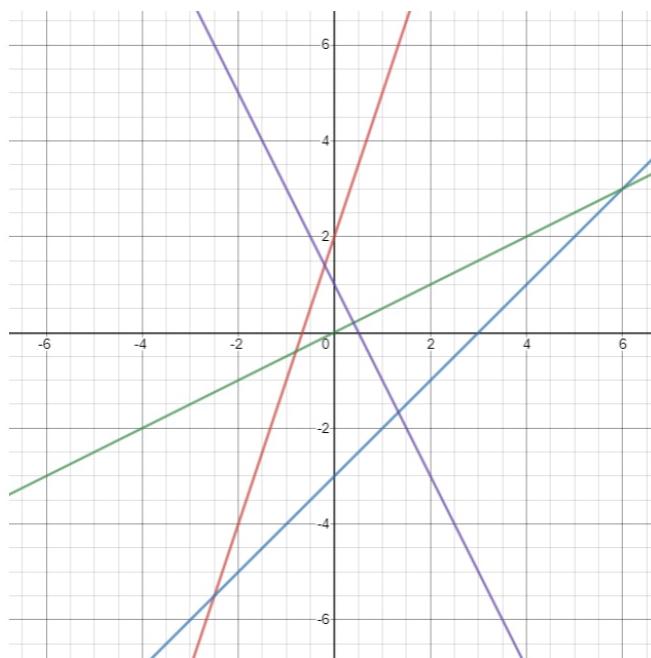
6) How many times do the lines $y = 2x - 4$ and $y = 10 + 2x$ intersect? Explain your reasoning.

7) Write down the equation of the line with gradient 5 and goes through the point (0, -3).

8) Write down the equation of the line with gradient -1 and goes through the point (2, 1).

9) Write down the equation of the line that goes through the points (2, 5) and (5, 11).

Simultaneous Equations

1) Solve the following pairs of equations simultaneously using the elimination method.

a) $3x - y = 8$
   $5x + y = 16$

b) $2a + 3b = 8$
   $-4a + 2b = 16$

c) $3x + 5y = 17$
   $4x - 2y = 1$

2) Solve the following pairs of equations simultaneously using the substitution method.

a) $a = 2b - 4$
   $3a + b = 23$

b) $3y - 2x = 10$
   $y = 4x + 5$

3) P is the point of intersection of the lines with equations $5x + 3y = 9$ and $7x - 2y = 25$ Write down the coordinates of P.

4) Kate buys 3 lollies and 5 choc ices for £7.00 Pete buys 2 lollies and 3 choc ices for £4.30 Work out the cost of one lolly. Give your answer in pence.

Inequalities and Regions

1) Write down the inequalities represented by the following number lines.
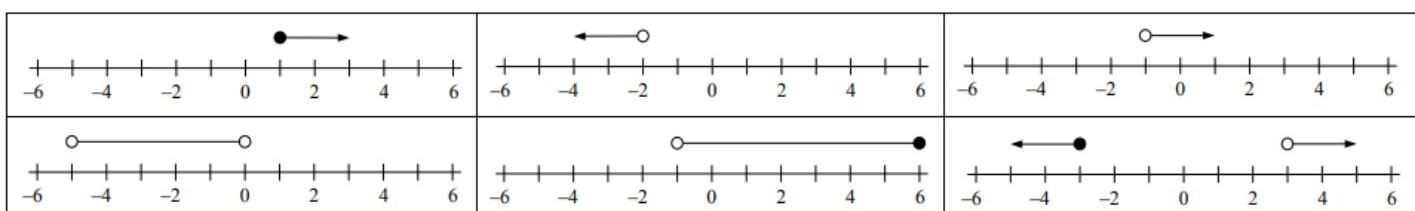
2) Represent the following inequalities on number lines.

a) $x > 4$ b) $2 \geq x$ c) $-5 < x \leq -1$ d) $x \geq 0 \; or \; x \leq -2$

3) List all of the integers which satisfy $-4 < x \le 1$.

4) Solve the following inequalities.

a) $3x - 4 \le 1$

b) $-7 \ge \frac{5x-2}{3}$

c) $3x - 11 \le 15 - 7x$

d) $15 - x < 4$

e) $1 \le 3x < 9$

f) $-4 < 10 - 2x < 13$

5) Hence, write down the smallest integer which satisfies 4e.

6) Work out the integer values of x that satisfy both the inequalities $3x - 4 \le 11$ and $2x + 3 > 9$.

7) Thomas goes to the market with £5 to spend. He buys a pineapple for £2 and spends the rest of the money on bananas. Each banana costs 60p. Write an inequality for the number of bananas Thomas can buy.

8) Draw a set of axes from -6 to 6 in your book for each of these questions. Shade the desired region.

a) $y > 4$

b) $-3 < x \le 2$

c) $y \le 2 \ and \ x > 0$

d) $y > x$

9) Write down the inequalities which satisfy the unshaded region of each graph below.
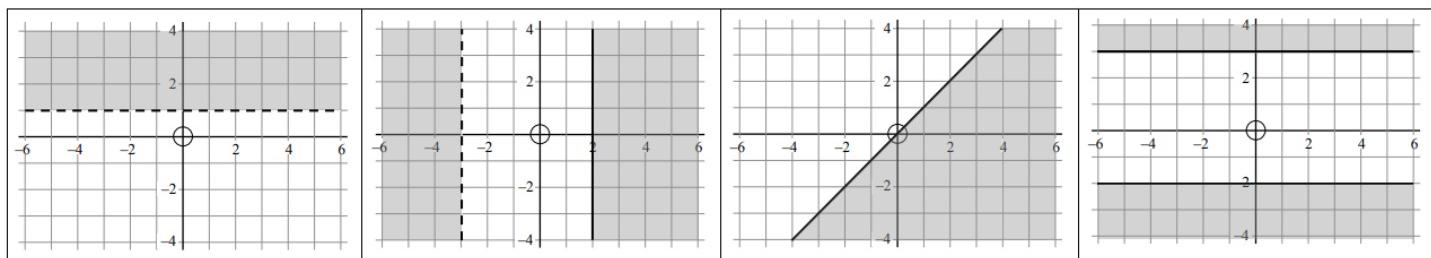
SHAPE, SPACE AND MEASURE

Shape Recap

1) Find the area of the following shapes.
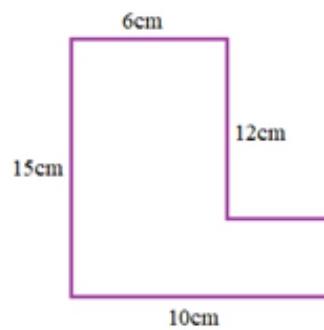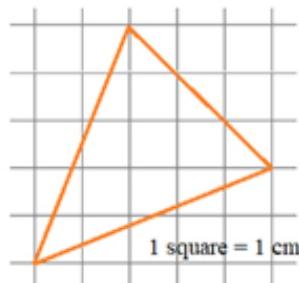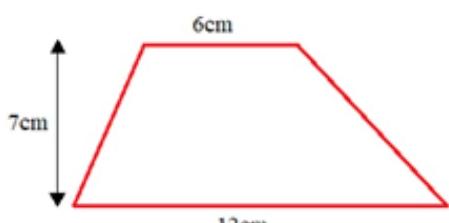

2) Find the missing angles. Give reasons for your answers.

a)
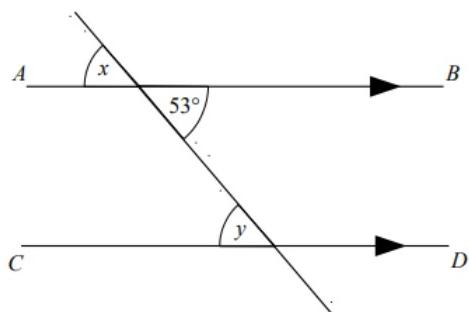
b)
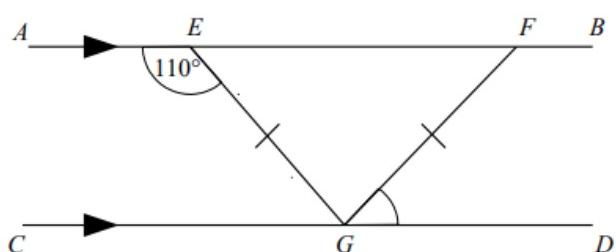
Pythagoras' Theorem

*1) Find the missing lengths.

a)

6 cm

8 cm

c

b)

12 cm

37 cm

b

c)

8.3 cm

2.1 cm

d

d)

39 cm

12 cm

x

9 cm

y
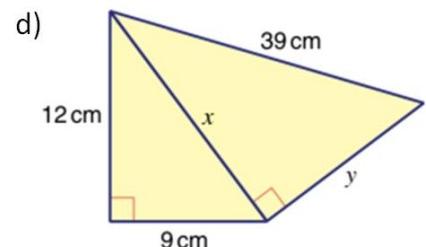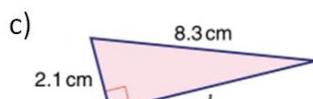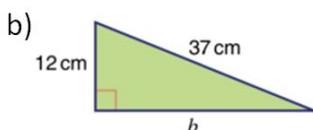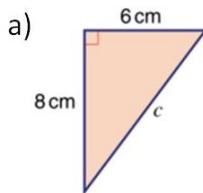
*2) Show whether the following triangles are right-angled.

a) 9cm, 40cm, 41cm

b) 8cm, 17cm, 20cm

c) 5cm, 12cm, 13cm

*3) ABCD is a trapezium. Find the length BC to 3 significant figures.

A   2.1 m   D

1.9 m

3.2 m

B   C
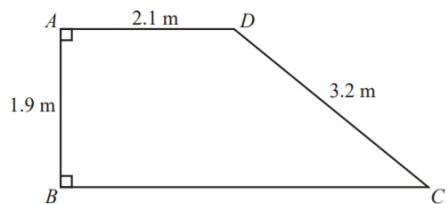
*4) ABCD is another trapezium. Find the length AC to 3 significant figures.

A

10 cm

9 cm

D

3 cm

B   C
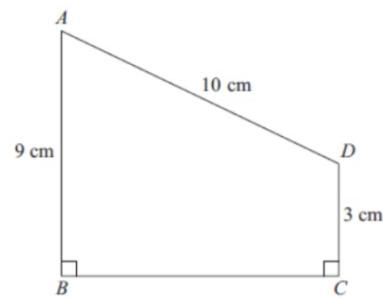
5) A ladder is 6 m long. The ladder is placed on horizontal ground, resting against a vertical wall. The instructions for using the ladder say that the bottom of the ladder must not be closer than 1.5 m from the bottom of the wall. How far up the wall can the ladder reach? Give your answer correct to 1 decimal place.

Bearings

1) Measure the bearings Q from P in the following diagrams.

a)

N

Q

P

b)

N

P

Q
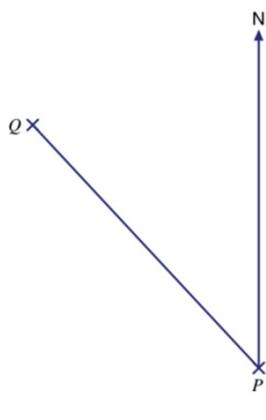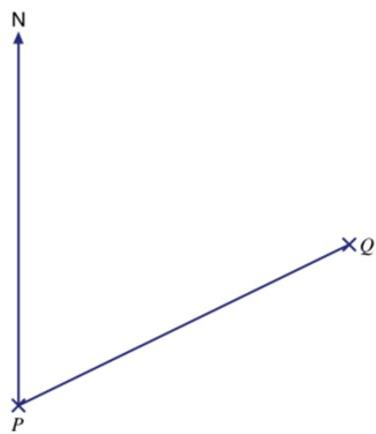
2) Cromer and Great Yarmouth are 20km apart on map and the bearing of Great Yarmouth from Cromer is 110°. The bearing of a ship from Cromer is 052°. The bearing of the same ship is 338° from Great Yarmouth. By drawing a scale drawing, using the scale of 2km = 1cm, find the distance of the ship from Cromer.

3) The bearing of B from A is 074°. The bearing of C from B is 180°. Given that AB = AC, work out the bearing of C from A.

Geometric Reasoning

1) The angle at the centre of a regular polygon is 20°.

a) How many sides does the polygon have?

b) What is the size of each exterior angle?

2) A regular polygon has an exterior angle of 15 degrees. How many sides does the polygon have?

3) A regular polygon has an interior angle of 162 degrees. How many sides does the polygon have?

4) All of the polygons below are regular. Work out the missing angles. Show your working.

a)

b)
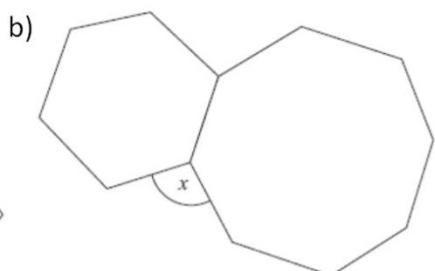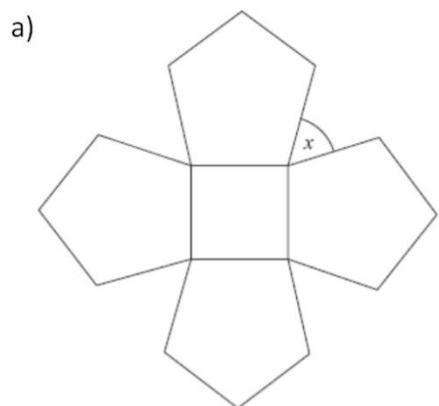
5) Which quadrilaterals have rotational symmetry of order 2 and two lines of symmetry?

6) Which quadrilateral has one pair of parallel sides, two pairs of equal angles and one line of symmetry?

Similar Shapes

1) AB is parallel to DE. ACE and BCD are straight lines.

a) Calculate AC   b) Calculate CD
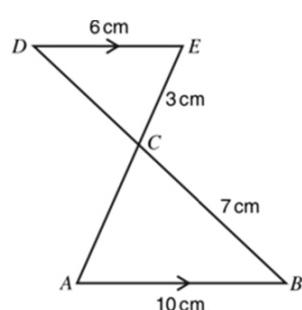
2) Given that triangles PQR and STU are similar, calculate the length of:

a) SU   b) QR

3)
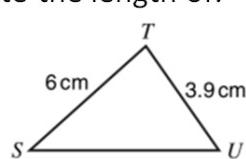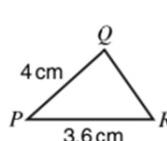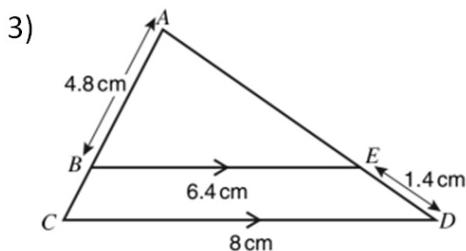
Calculate the length a) BC   b) AE

4)
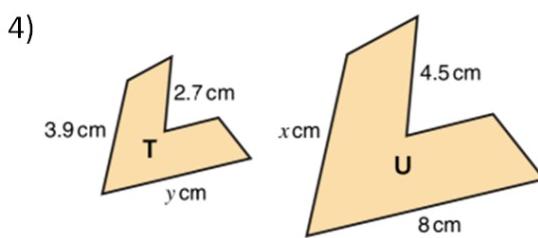
Hexagons T and U are similar. Find x and y.

Compound Measure

*1) A car is travelling at an average speed of 85 m/s. Work out the time it takes to travel 34 m.

2) Greg went of a cycle ride. He rode for 4 hours and 15 minutes at an average speed of 20 km/h. Work out the distance that Greg rode.

*3) John drove from his home to visit a friend. John drove the first 3 hours at an average of 40 km/h. John drove the remaining 60 km to his friend's house at 30 km/h. What was John's avaerage speed for the whole journey?

*4) 14.7 g of Sulphar has a volume of 7.5 cm^3. Work out the density of Sulphar.

*5) Janet ran 3800 m in 40 minutes. Work out her speed in km/h.

*6) Two metal blocks each have a volume of 0.5 m^3. The density of the Copper block is 8900 kg/m^3. The density of the Nickel block is 8800 kg/m^3. Calculate the difference in the masses of the blocks.

Volume and Area

1) Calculate the area of the shapes below.

a)

b)
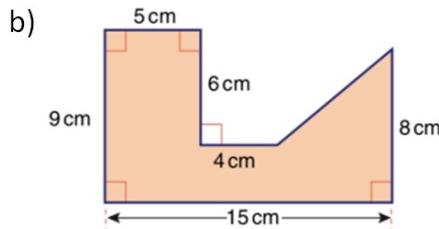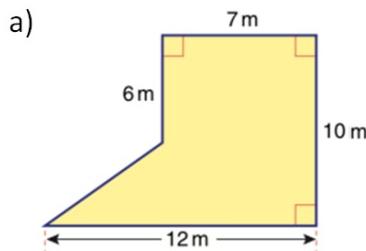
*2) The radius of a cylindrical tin of soup is 3.8 cm. Ignoring any overlap, work out the length of the label.

*3) Calculate the area of the shaded part of the diagram below. Give your answer to 2 decimal places.
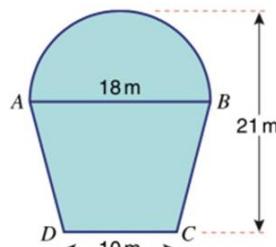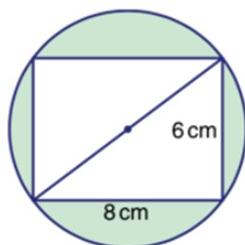
*4) Calculate the area of the shape above. Give your answer to 2 decimal places.

5) The circumference of a circle is 30π m. What is its area? Leave your answer in terms of pi.

*6) The diameter of a cylinder is 8.6 cm and its height is 14 cm. What is the volume of the cylinder? Give your answer to 3 significant figures.

*7) Find the volume and surface area of the prism shown below.
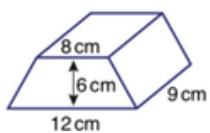
8) A packet of butter measures 11 cm by 6.5 cm by 4 cm. A box measures 55 cm by 26 cm by 24 cm. How many packets of butter are needed to fill the box?

DATA

Data Recap

1) The pie chart shows some information about the time Gill spent working in her garden one month.
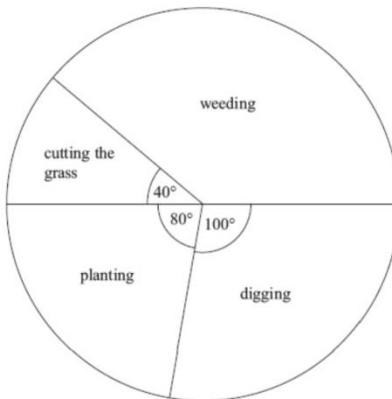
a) What fraction of the time did Gill spend cutting the grass?

b) Gill spent 7 hours weeding. How much time did Gill spend planting?

2) Janine recorded the times, in seconds, for each of 15 people to do a puzzle. Here are her results:

$$90, 81, 78, 83, 68, 75, 79, 81, 69, 87, 76, 91, 67, 73, 81$$

a) Draw a stem-and-leaf diagram to represent this information.

b) Find the median.

c) What fraction of people took more than 85 seconds?

d) Find the interquartile range.

Averages

1) The list below shows the number of cars sold at a garage in the last ten days.

3	2	7	8	4	9	7	5	7	3

a) Find the mode.   b) Find the median.   c) Find the mean.

2) The mean weight of a group of five boys is 56 kg. When a sixth boy joins the group, the mean weight goes up to 58 kg. What is the weight of the sixth boy?

3) The table shows the numbers of cakes sold to 30 customers.
a) What is the modal number of cakes sold?
b) What is the mean number of cakes sold?
c) What is the median number of cakes sold?

Number of cakes	Number of customers
0	2
1	9
2	6
3	6
4	5
5	2

4) The table shows the information about the number of minutes 125 students spent doing homework yesterday.
a) Find the median class interval.
b) Work out an estimate for the mean.

Number of minutes (t)	Frequency (f)
$0 < t \leqslant 20$	10
$20 < t \leqslant 40$	20
$40 < t \leqslant 60$	30
$60 < t \leqslant 80$	35
$80 < t \leqslant 100$	25
$100 < t \leqslant 120$	5

5) Nestor achieved a mean score of 20 in three games. The score for each game is as follows:

Game 1: 3x + 10   Game 2: 2x + 5   Game 3: x – 3

Work out the value of x and his total points scored.

Cumulative Frequency and Box Plots

1) The graphs shows information about the weight of 80 plums.

a) Use the graph to find an estimate for the number of plums that weigh less than 25 grams.

b) Use the graph to find an estimate for the number of plums that weigh more than 30 grams.
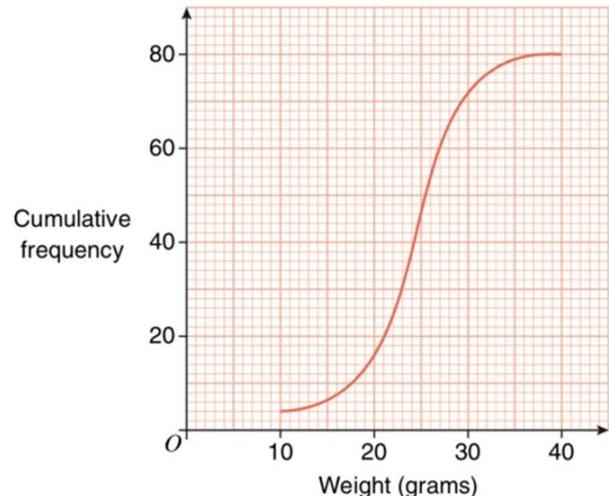
2) The table gives information about the luggage weight of 200 passengers.

a) Use the information in the table to draw a cumulative frequency graph.

b) Use your cumulative frequency graph to find

    (i) the number of passengers who weigh more than 15kg.

    (ii) the median

    (iii) the interquartile range

Luggage weight (w kg)	Cumulative frequency
$0 < w \leqslant 4$	6
$0 < w \leqslant 8$	22
$0 < w \leqslant 12$	83
$0 < w \leqslant 16$	155
$0 < w \leqslant 20$	196
$0 < w \leqslant 24$	200

3) Using the information below, which class did better? You must justify your answer.

Students in class 8P and class 8Q took the same test. Their results were used to draw the following box plots.
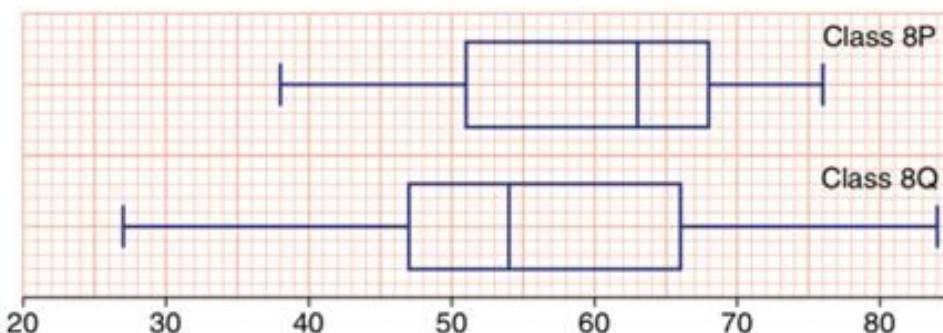
4) 60 boys and 60 girls each answered a number of questions. The information about the time they took is represented in the cumulative frequency graphs. Minimum time for boys and girls was 37 and 35 respectively. The maximum time was 85 for girls and 76 for boys.

a) Use the graphs to draw two box plots – one for the girls and one for the boys.

b) Use these to make comparisons about the two sets of data.
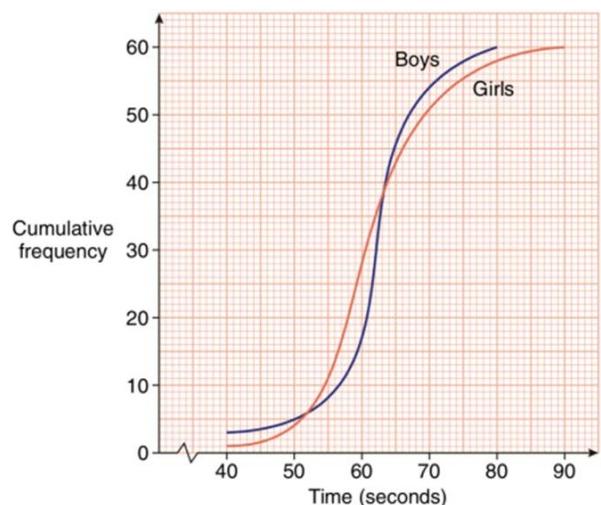
Scatter Graphs

1) Nick sells ice creams. The table shows the temperature at noon and how many ice creams he sells each day for a fortnight.

Noon temperature (°C)	20	28	18	24	30	22	21	16	29	19	27	26	23	27
Number of ice creams	70	86	58	76	97	78	65	58	91	63	93	91	79	82

a) Draw a scatter graph to represent this data.

b) Describe the relationship between the temperature and the number of ice creams sold.

c) Draw a line of best fit. Describe the correlation shown.

2) Look at the table below. What sort of correlation would you expect between the variables shown?

	Positive correlation	Negative correlation	No correlation
ages of cars and their value		✓	
heights of women and their weekly pay			
the number of students and the number of teachers in a school			
the distance a motorist drives and the amount of petrol used			
the hat sizes of students and their GCSE maths marks			
the amount of rain one day at a seaside town and the number of people on the beach			

3) The scatter graph shows the age and price of 15 Vector cars.

a) Describe the correlation between age and price of the cars.

b) Use the line of best fit to find:

    (i) The price of a 6 year old car.

    (ii) The age of a vector car that cost £6200.

c) Why would it not be sensible to use the line of best fit to estimate the price of an 11 year old car?
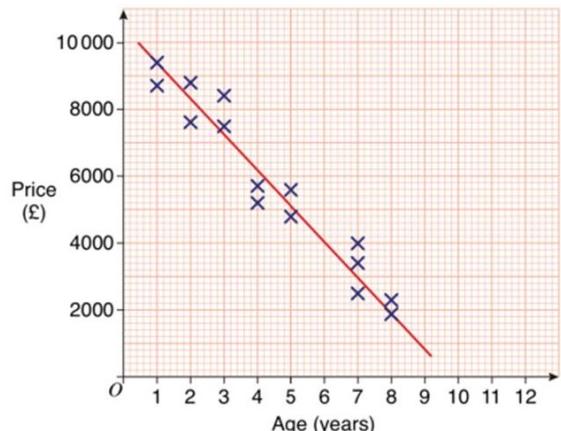
Probability

1) Ben has 15 ties in a drawer. 7 are plain, 3 are striped and the rest are patterned. Ben chooses a tie at random. Find the probability that it is:

a) Plain   b) Striped   c) Patterned

2) A roundabout has four roads leading from it. Michael is driving around the roundabout. Use the table to work out the following.

| Liverpool	Trafford Park	Eccles	Bolton
0.49	0.18	x	0.23

a) The probability he did not take the road to Liverpool.

b) The value of x.

c) The probability he will either take the road to Trafford Park or the road to Bolton.

3) A bag contains a red counter, a blue counter, a white counter and a green counter. Asif takes a counter out at random. He does this 400 times.

Red	Blue	White	Green
81	110	136	73

a) What is the relative frequency of Asif taking out a red counter?

b) Asif takes a counter out one more time. Estimate the probability that it will be blue.

4) The probability that Jason will receive a book for Christmas is $\frac{4}{5}$. The probability that he will receive one for his birthday is $\frac{3}{8}$. These two events are independent. Draw a probability tree to represent these events. What is the probability Jason will receive at least one book?

5) The probability that a biased coin shows heads when it is thrown is 0.4. Lucy throws the coin 3 times.

a) What is the probability that she gets heads all three throws?

b) What is the probability that she gets heads on exactly one throw?

6) 500 people were surveyed. All of the people were either left handed or right handed. 53 of the people are left handed. 26 males are left handed. 231 of the people are male.

a) Use this information to complete the frequency tree.
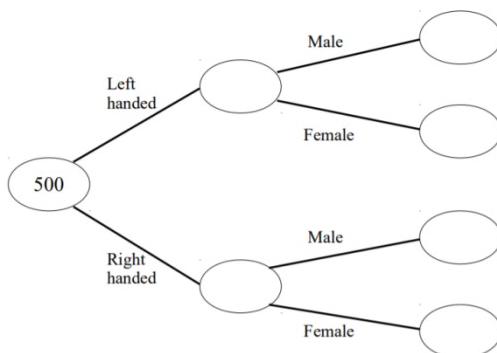
b) One of the left handed people is chosen at random. Write down the probability that they are female.

7) Out of 50 people surveyed: 30 have a brother, 25 have a sister and 6 have neither a brother nor a sister. Use this information to complete the Venn diagram.
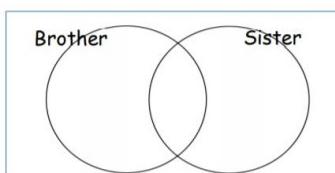
Answers

Number Recap

1) a) 366.52   b) 745.6   c) $1\frac{11}{18}$ d) $\frac{9}{14}$ e) $\frac{1}{2}$

2) $\frac{5}{9}, 0.567, 58\%, \frac{7}{12}, 0.62, \frac{5}{8}, \frac{16}{25}, 65\%$

3) a) i) $108 = 2^2 \times 3^3$ ii) $288 = 2^5 \times 3^2$ b) HCF = 36, LCM = 864   c) 36   d) 32

Percentages

1) a) 13.44   b) 105.4   c) 14.7

2) a) 19.53   b) 86.14   c) 285.796

3) £476   4) 25%   5) £340   6) 10,603.20   7) 32%   8) £45   9) 40

Using a Calculator

a) 6.990174661   b) 5.539611801   c) 97.67486491   d) 13.83088323

Rounding and Estimating

1) a) 36.8   b) 3.97   c) 92.06   d) 116.0

2) a) 500   b) 3,640   c) 6,000   d) 0.0031   e) 0.0750

3) a) 10   b) 7   c) 1,000   d) 450

4) Underestimate e.g. smaller number divided by bigger number will be smaller or actual answer is 1,341.83…

Indices

1) a) $8x^3y^6$ b) a^6 c) 2^7 d) 7^{x+3} e) 5^8

2) a) $x = 16$ b) $x = 2$ c) $x = 1$

3) a) $\frac{1}{16}$ b) 3   c) $\frac{1}{5}$ d) 9   e) $\frac{1}{216}$ f) 1   g) $\frac{3}{2}$

4) a) $x = \frac{1}{2}$ b) $x = -1$ c) $x = \frac{2}{3}$ d) $x = -2$ e) $x = 3$ f) $x = 81$ g) $x = 8$

Standard Form

1) a) 1.23×10^4 b) 8.409×10^6 c) 6.7×10^{10} d) 3.6×10^{-3}

e) 8.95×10^{-7} f) 3.096×10^{-4}

2) a) 700,000   b) 2,900,000,000   c) 1,072   d) 0.00008

e) 0.0457   f) 0.00000003689

3) a) 7×10^8 b) 2.56×10^{27} c) 2.56×10^{-17} d) 2×10^5

e) 6×10^{12} f) 7.5×10^{-10}

Ratio and Proportion

1) a) 2:3   b) 15:4   c) 3:28   d) 15:4

2) £120   3) 20:33   4) 35   5) $x = 6$ 6) 4 toilet rolls   7) 6 days   8) 4

9) a) Increase b) 63 of each

<u>Recurring Decimals</u>

1) a) 0.3125   b) $0.\dot{4}$ c) $0.\dot{6}\dot{3}$ d) $0.58\dot{3}$ e) $3.6\dot{1}$ f) $0.\dot{8}5714\dot{2}$

2) a) $\frac{6}{11}$ b) $\frac{11}{30}$ c) $\frac{38}{111}$ d) $\frac{151}{165}$ e) $2\frac{59}{75}$

<u>Algebra Recap</u>

1) a) $24d^3g^2h$ b) $-6m - 4n - 6$ c) $8x^2 - 5x - 8xy$

2) a) 2.5   b) 16   c) 7.4   d) -6   e) $\frac{1}{12}$

f) $1\frac{2}{3}$ g) 4   h) -60   i) -82

3) $3(x + 5) - 7 = 4x$ so $x = 8$

4) a) -4   b) -10   c) 3   d) $2\frac{1}{6}$ e) -30

5) $x = 5.4$ (1dp)

<u>Expanding Brackets</u>

1) a) $16m + 7$ b) $47a - 46$ c) $-6y - 21$

2) a) $x^2 + 2x - 15$ b) $2a^2 - 11a + 12$ c) $y^2 + 14y + 49$ d) $16b^2 - 25$

<u>Factorising Expressions</u>

1) a) $6(4x - 3)$ b) $4xy(8x + 7y)$ c) $(x + 3)(x + 4)$ d) $(x - 5)(x + 4)$

e) $(x + 3)(x - 3)$ f) $(x - 8)(x - 5)$ g) $3a(14a - 9)$ h) $(g + 9)(g - 4)$

i) $(2m + 4n)(2m - 4n)$ or $4(m + 2n)(m - 2n)$ j) $4(3xy - 5y + 2x^2)$

<u>Solving Quadratic Equations</u>

1) a) $x = \frac{2}{3}$ $or - 5$ b) $x = -2 \ or - 3$ c) $x = \pm7$ d) $x = 7 \ or - 2$ e) $x = \pm2$ f) $x = 4 \ or \ 9$

2) $x = 2$ ($x \neq -8$ because a length cannot be negative)

<u>Algebraic Fractions</u>

1) a) $\frac{16bd^2}{15ac}$ b) $\frac{3x^2}{w^3z}$ c) $\frac{1}{4}$ d) $\frac{1}{5d}$ e) $\frac{5}{9}$

2) a) $\frac{19x}{20}$ b) $\frac{5}{12}$ c) $\frac{5x-3}{(x+5)(x-2)}$ d) $\frac{4x-17}{(x-1)(x-3)}$

3) a) $x = 1.5$ b) $x = \frac{37}{7}$ c) $x = 5 \ or - 4$

4) a) $x = \pm6$ b) $x = \frac{7}{3}$ c) $x = 5 \ or - 4$

<u>Sequences</u>

1) a) 19, 23   b) 20, 14   c) 0.25, 1

2) a) $3n - 1$ b) 5n + 3   c) -4n + 15   d) 0.6n + 0.6n

3) 224

4) 6n − 1 = 247 so n = 41.3333... No, it is not in the sequence.

5) -1, 4, 15, 32, 55

6) a) n^2 b) $3n^2$ c) $3n^2 + 1$ d) $\frac{n}{2n+1}$

Changing the Subject

a) $x = \frac{5-7y}{6}$ b) $x = \frac{a(9+b)}{2}$ c) $x = \frac{k-3}{h} - n$ d) $x = \frac{pr-a}{4}$ e) $x = 3y^2 + d$

f) $x = \frac{(wk)^2}{4}$ g) $x = \sqrt{\frac{ab}{d-c}}$ h) $x = \frac{(1-y)^3}{a}$ i) $x = \frac{2k+w}{p}$ j) $x = \frac{5+ay}{a}$

Straight Line Graphs

1)
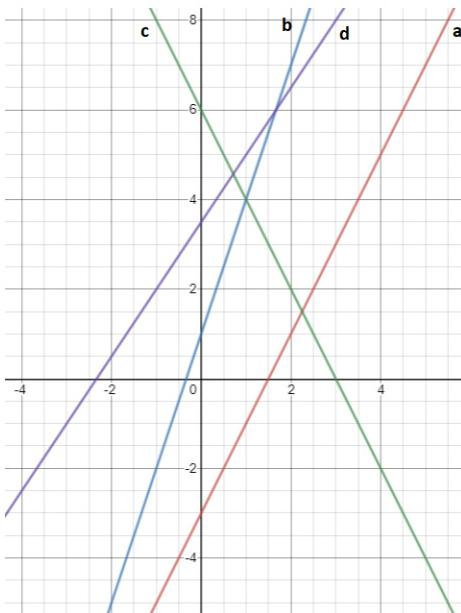
2) Yes e.g. $y = 4 \times 5 - 11 = 9$

3) m = $\frac{2}{3}$, c = -2

4) (1, -4)

5) Blue: $y = x - 3$ Red: $y = 3x + 2$ Green: $y = 0.5x$ Purple: $y = -2x + 1$

6) Never because they are parallel

7) $y = 5x - 3$

8) $y = -x + 3$

9) $y = 2x + 1$

Simultaneous Equations

1) a) $x = 3, y = 1$ b) $a = -2, b = 4$ c) $x = 1.5, y = 2.5$

2) a) $a = 6, b = 5$ b) $x = -0.5, y = 3$

3) (3, -2)   4) 50p

Inequalities and Regions

1) a) $x \geq 1$ b) $x < -2$ c) $x > -1$ d) $-5 < x < 0$ e) $-1 < x \leq 6$ f) $x \leq -3 \text{ or } x > 3$

2)
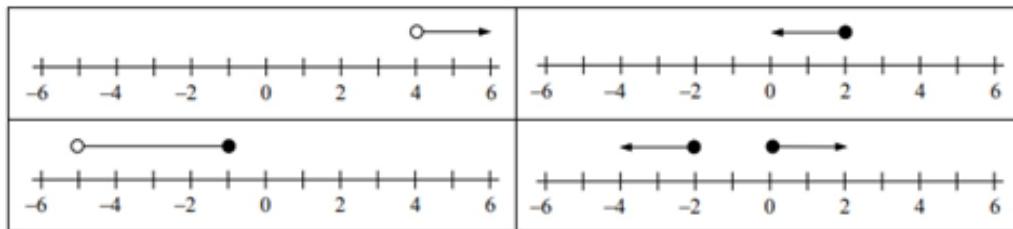

3) -3, -2, -1, 0, 1

4) a) $x \leq \frac{5}{3}$ b) $x \leq -\frac{19}{5}$ c) $x \leq 2.6$ d) $x > 11$ e) $\frac{1}{3} \leq x < 3$ f) $-\frac{3}{2} < x < 7$

5) 1   6) 4, 5   7) $0.6x + 2 \leq 5 \Rightarrow x \leq 5$
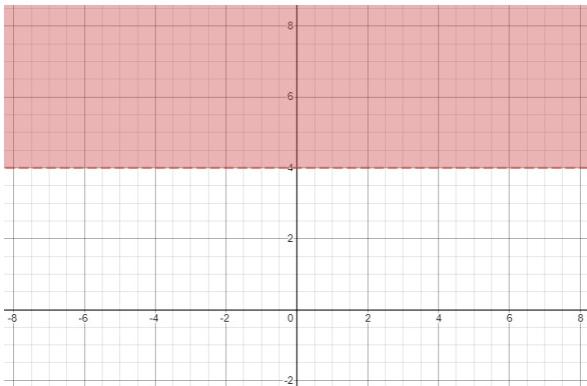
8) a)   b)
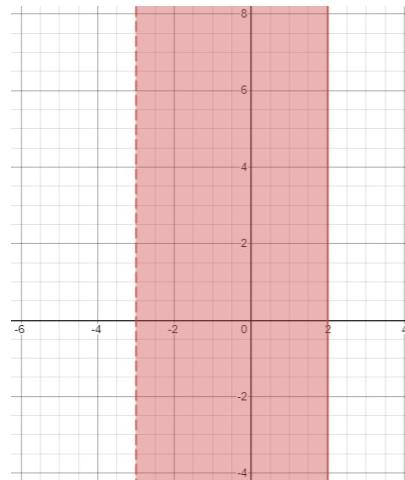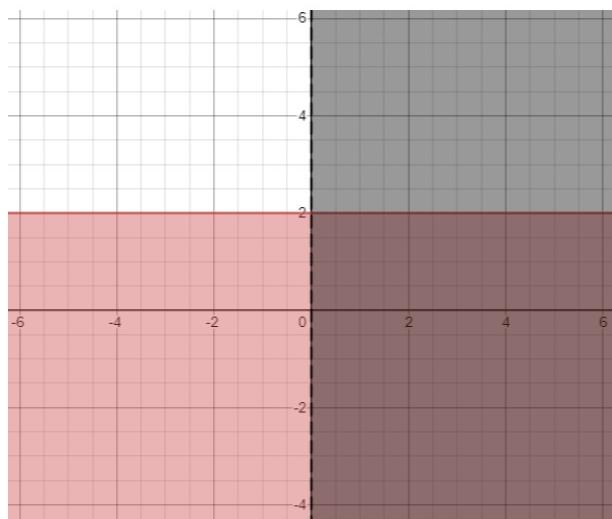
c)   d)
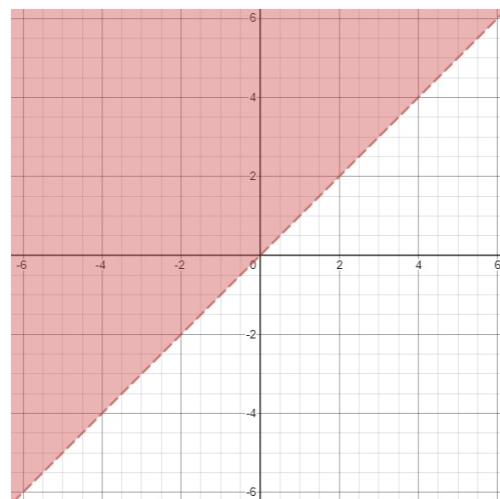
9) a) $y < 1$ b) $-3 < x \leq 2$ c) $y \geq x$ d) $-2 \leq y \leq 3$

Shape Recap

1) a) 63cm^2 b) 10.5cm^2 c) 102cm^2

2) a) $x = 53°$ (vertically opposite angles are equal), $y = 53°$ (alternate angles are equal)

2) b) $FEG = 70°$ (angles on a straight line add up to 180°)

    $CGE = 70°$ (alternate angles are equal)

    $EFG = 70°$ (base angles of an isosceles triangle are equal)

    $DGF = 70°$ (alternate angles are equal)

Pythagoras' Theorem

1) a) 10cm   b) 35cm   c) 8.03cm   d) x = 15cm, y = 36cm

2) a) Yes $\sqrt{(9^2+40^2)}$ = 41   b) No $\sqrt{(8^2+17^2)} \neq$ 20   c) Yes $\sqrt{(5^2+12^2)}$ = 13

3) 2.57m

4) 12.0cm

5) 5.8m

Bearings

1) a) 317° b) 065° 2) 7.7cm   3) 106°

Geometric Reasoning

1) a) 18   b) 20°

2) 24

3) 20

4) a) 54° b) 105°

5) Rectangle and rhombus

6) Isosceles trapezium

Similar Shapes

1) a) 5cm   b) 4.2cm

2) a) 5.4cm   b) 2.6cm

3) a) 1.2cm   b) 5.6cm

4) x = 6.5cm, y = 4.8cm

Compound Measure

1) 0.4 seconds   2) 85km   3) 36km/h

4) 1.96g/cm^3 5) 5.7km/h   6) 50kg

Volume and Area

1) a) 80m^2 b) 87.5cm^2 2) 23.9cm   3) 30.54cm^2 4) 295.23m^2 5) 225π

6) 813cm^3 7) 540.0cm^3, 413.8cm^2 8) 120 packets

Data Recap

1) a) $\frac{40}{360} = \frac{1}{9}$ b) 4 hours

2) a)

```
6 | 7 8 9
7 | 3 5 6 8 9
8 | 1 1 1 3 7
9 | 0 1
```

Key:

6 | 7 means 67

b) 79   c) $\frac{3}{15} = \frac{1}{5}$ d) 83 − 73 = 10

Averages

1) a) 7   b) 6   c) 5.5   2) 68kg

3) a) 1   b) 2.3   c) 2   4) a) $60 < t \le 80$ b) 59.6   5) x = 8, total = 60

Cumulative Frequency and Box Plots

1) a) 45   b) 8

2) a)

Cumulative frequency against Weight (w kilograms)
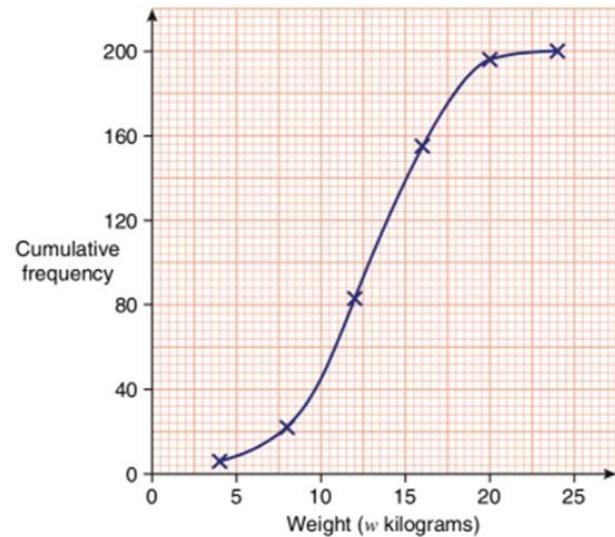
b) i) 60   ii) 13kg   iii) 5.5kg

3) Class 8P e.g. their median is higher than 8Q, 50% of students in 8P scored over 63 marks compared to top 50% of 8Q scored over 54 marks.

4) a)

Girls — Time (seconds)

Boys — Time (seconds)
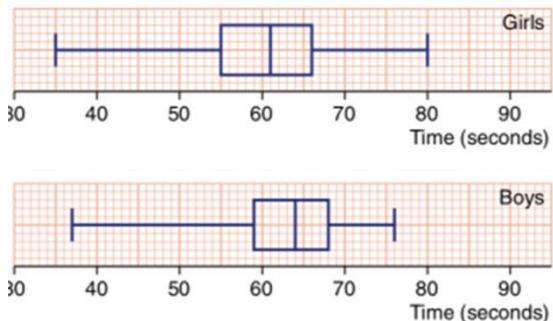
b) e.g. The range of the girls' times was larger than the range of the boys' times.

The first 50% of the girls finished before the first 50% of the boys.

The girls finished quicker on average because their median was smaller than the boys' median.

Scatter Graphs

1) a)
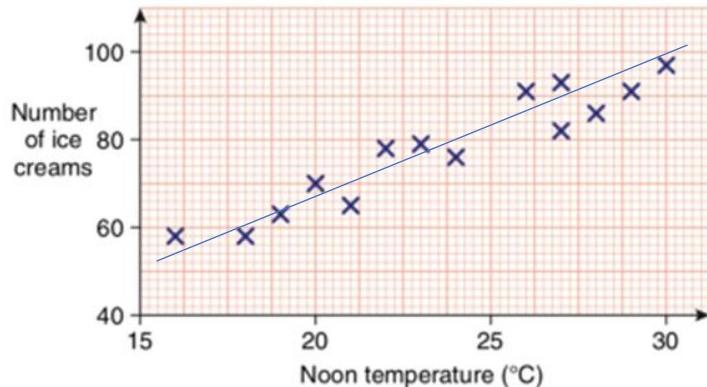
b) The higher the temprature at noon, the more ice creams Nick sells.

c) A positive correlation.

2) a) Negative   b) No correlation   c) Positive   d) Positive   e) No correlation   f) Negative

3) a) Negative correlation

b) i) £4000   ii) 4years

c) Outside of the data (extrapolation).

Probability

1) a) $\frac{7}{15}$ b) $\frac{1}{5}$ c) $\frac{1}{3}$

2) a) 0.51   b) 0.1   c) 0.41

3) a) $\frac{81}{400}$ b) i) 0.275   ii) 0.1825

4) $\frac{7}{8}$ 5) a) 0.064   b) 0.432

6) a)   7)

b) $\frac{27}{53}$